

PATENT SPECIFICATION

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(54) IMPROVEMENTS IN AND RELATING TO WASHING MACHINES

(71) We, BRITISH DOMESTIC APPLIANCES LIMITED, of Peterborough, a British Company, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to domestic clothes washing machines of the non-automatic type incorporating a bowl arranged to contain a liquid washing agent consisting of water in which a soap-powder or other detergent powder has been dissolved, and into which clothes to be washed are arranged to be placed, which bowl also incorporates agitating means such as an impeller or gyrator, for producing a movement of the liquid through the clothes to effect the washing action.

It is important in the washing of clothes that the soap powder or detergent powder, both of which will hereinafter be referred to simply as "the detergent", be adequately dissolved in the water before the washing operation commences otherwise a quantity of undissolved detergent could be deposited on the clothes, which may in some circumstances, cause local bleaching of the fabric. In more expensive washing machines of the type provided with automatic programme controllers for effecting a set sequence of washing operations the detergent may be released gradually into a flowing stream of water entering the bowl of the machine in response to a signal derived from the programme controller, or, alternatively, a signal derived from the programme controller may be utilized to operate a valve to direct a stream of water through a detergent container and thence to the bowl of the machine. These solutions are not applicable to cheaper machines which are not equipped with automatic programme controllers, and it has hitherto been necessary in use of such non-automatic machines to add the detergent by hand to the water in the bowl before a washing operation commences, and preferably before the clothes are placed in the bowl. How-

ever this operation is time-consuming and often unsuccessful insofar as the introduction of the detergent into the water in bulk may result in some of the detergent remaining undissolved — particularly when effected immediately prior to the clothes being placed in the bowl as may occur for example when the user of the machine has been previously occupied with some other part of the washing operation. This problem is particularly acute in so-called twin-tub washing machines, that is machines of a composite construction in which the washing machine bowl and the drum of a spin-drying machine are mounted side-by-side within a single cabinet, as a user of such a twin-tub machine is frequently occupied with the loading or unloading of the drum of the spin-drying machine at a time when detergent should be added to the washing machine bowl for a subsequent washing operation.

An object of the present invention is to provide a clothes washing machine of the type referred to, in which the above mentioned disadvantages are substantially avoided.

According to the present invention a clothes washing machine of the type referred to is provided with a dispenser mounted above the normal level of liquid in the bowl and designed to receive a quantity of detergent required to be added to the liquid, the dispenser having an inlet opening and an outlet opening for the passage of liquid through the dispenser, the outlet opening communicating with the bowl and the dispenser being so constructed as to be gradually emptied of the quantity of detergent contained therein by the liquid entering the bowl through the dispenser, and provided with a re-circulating system including a pump and a filter by which liquid is removed from the bowl, filtered, and returned thereto in use of the machine, wherein the return path of the re-circulating system incorporates a passage external to the bowl and communicating with the inlet opening of the dispenser such that at least some of the liquid returns to the

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bowl through the dispenser. Preferably, the passage is provided with a manually operated valve through which the washing liquid can be diverted through a waste pipe to a drain, e.g., at the end of a washing operation, to be removed thereby from the bowl instead of being fed back into the bowl.

The gradual introduction of detergent into the washing machine bowl by the flow of liquid avoids the presence of large masses of undissolved detergent in the bowl. The invention has the further advantage that by utilising a dispenser of an appropriate size related to the capacity of the washing machine bowl, or by the provision of a level indicator within the dispenser to indicate when the required amount of detergent has been placed therein, the inadvertent use of an excessive amount of detergent is avoided.

One embodiment of the invention will now be described by way of an example with reference to the accompanying drawings which show a so-called twin-tub washing machine and in which:

Figure 1 is a plan view of a twin-tub washing machine, an access cover to the machine being removed,

Figure 2 is a partial diagrammatic sectional view of the machine shown in Figure 1,

Figure 3 is a partial sectional view on the line III—III in Figure 2, and

Figure 4 is a partial sectional view corresponding to part of Figure 2.

Thus, referring to Figures 1 and 2, a so-called twin-tub, non-automatic clothes washing machine comprises an outer casing 1 in which is mounted a vertically disposed bowl 2 within which an agitator 3 is driven in oscillatory fashion by an electric motor 4 (Figure 2) through a gear-box 5. The casing 1 also contains a spin-drying machine comprising a drum 6 supported within the casing for rotation at a high speed about a vertical axis and also driven by an electric motor, (not shown).

The casing 1 is provided with a console 7 which includes controls for both the washing and the spin drying machines; the control for the spin drying machine will not be described in detail but comprises a safety cut-out switch (not shown) associated with a lid (not shown) for the spin-drying machine and arranged to prevent energisation of the spin-dryer motor when the lid is opened, and a main control switch 8 by means of which a user of the machine may select one of two alternative modes of operation of the spin-dryer.

The controls for the washing section of the machine consist of a timer control knob 9 which enables a user of the machine to set the overall length of a washing operation, and a thermostat 10 for a heating element (not shown) which is mounted within the wash bowl 2 beneath the agitator 3.

Mounted within the console 7 above the wash bowl 2 is a dispenser 11 (shown in sec-

tion in Figure 3) which comprises a detergent container 12 closeable by a cover 13 hinged to the container, the cover 13 being shown in its opened position by broken lines in Figure 2. The container 12 comprises a lower channel shaped portion having a floor which slopes downwardly from a pipe 14 for water or washing agent entering the dispenser to an outlet 15 to the wash bowl, and an upper portion in the form of a box open at the top and bottom and located within the lower portion with the lower edges of its walls spaced from the floor as shown more clearly in Figure 3 to define a passage for liquid flowing through the dispenser. When the electric motor 4 is energised washing agent is circulated within the washing machine by means of a pump 16 (Figure 2) which removes washing agent from the wash bowl 2 through a pipe 17 which is provided with a filter 18 and returns it thereto through a pipe 19, a valve assembly 20 (which is shown in section in Figure 4), the inlet pipe 14 to the dispenser 11 and the passage provided through the dispenser.

A port 21 (figure 1) is provided in the console 7 adjacent the dispenser 11 into which port a flexible hose for passing washing agent directly into the wash bowl 2 from a tap may be inserted in order to fill the wash bowl.

Washing agent contained in the wash bowl 2 at the end of a washing operation may be extracted by means of the pump 16 through the valve assembly 20 (Figure 4) which is provided with a rubber flap valve 22 which in its normal operative position closes an outlet orifice 23, being held there by the pressure of washing agent within the valve assembly 20 but which may be changed over to its alternative position (shown dotted) by the insertion of a flexible hose 24 (indicated by broken lines) into the orifice 23 which simultaneously closes an outlet orifice 25 communicating with the pipe 14, and in which position washing agent removed from the bowl 2 by the pump 16 passes through the hose 24 to a suitable drain.

Thus, in a normal washing operation, a load of clothes is placed in the wash bowl 2 together with a quantity of water sufficient to fill the bowl to a suitable level, the water being admitted to the bowl by means of a flexible hose inserted in the port 21, and a suitable charge of detergent is poured into the container 12 of the dispenser 11. When the user of the machine desires a washing operation as such to commence, that is subsequent to any soaking and/or heating period, the timer control knob 9 is set to a desired washing period. Operation of the timer causes energisation of the electric motor 4 which drives both the agitator 3 in an oscillatory manner, agitating the clothes in the water, and the pump 16, with the result that water is removed from the bowl 2 through the filter 18 and is circulated through the pipe 19, the valve 20 and the pipe 14, to the dis-

5 dispenser 11 where it impinges on the floor of
 the detergent container 12 and floods under
 the container before passing into the
 wash bowl. As the water passes along the floor
 of the container 12 it effectively 'slices' away
 the bottom layer of the charge of detergent
 contained therein carrying it into the washing
 machine bowl so that the dispenser is gradually
 emptied of detergent. The resulting violent in-
 10 termixing of the detergent and the water causes
 the detergent rapidly to disperse and the re-
 sulting washing agent solution passes into the
 wash bowl. The shape of the side walls of the
 dispenser container and the relative position
 15 of the floor beneath it are such as to prevent
 water or washing agent wetting the walls of
 the container as the detergent is carried away
 so that the walls are left dry for any subse-
 quent load of detergent. Washing agent con-
 20 tinues to circulate through the pipes and the
 dispenser after the dispenser has been emptied
 of detergent and until the washing operation
 is completed when it may be pumped away
 via the hose 24 inserted into the valve 20
 25 (Figure 4).

It will be appreciated that the use of a con-
 tinuous circulating liquid system permits the
 inclusion of a soaking and/or a heating period
 before the detergent is added to the liquid
 30 without the use of any form of valve or other
 means for diverting liquid through the dis-
 penser.

Although the invention is particularly ap-
 plicable to a 'twin-tub' washing machine where
 the user may be required to attend to both
 the spin-dryer and the washing machine at the
 same time it will be of value in a non-automat-
 ic upright washing machine only.

WHAT WE CLAIM IS:—

40 1. A clothes washing machine of the type
 referred to provided with a dispenser mounted
 above the normal level of liquid in the bowl
 and designed to receive a quantity of deter-
 gent required to be added to the liquid, the
 45 dispenser having an inlet opening and an outlet
 opening for the passage of liquid through the
 dispenser, the outlet opening communicating
 with the bowl and the dispenser being so con-
 structed as to be gradually emptied of the
 50 quantity of detergent contained therein by the
 liquid entering the bowl through the dispenser,
 and provided with a re-circulating system in-
 cluding a pump and filter by which liquid
 is removed from the bowl, filtered, and re-
 55 turned thereto in use of the machine, and
 wherein the return path of the re-circulating

system incorporates a passage external to the
 bowl and communicating with the inlet open-
 ing of the dispenser such that at least some
 of the liquid returns to the bowl through the
 dispenser.

2. A clothes washing machine according to
 Claim 1, wherein said passage is provided with
 a manually operable valve by which the liquid
 can be diverted through a waste pipe to a
 drain, instead of being fed back into the bowl.

3. A clothes washing machine according to
 Claim 2, wherein the valve is a flap-valve
 which is normally held closed by the pressure
 of liquid passing to the dispenser through the
 recirculating system, but is arranged to be
 opened by means of a co-operating length of
 tubing inserted into the valve, the tubing
 simultaneously closing an outlet orifice to the
 dispenser and being arranged to divert the
 liquid to said drain.

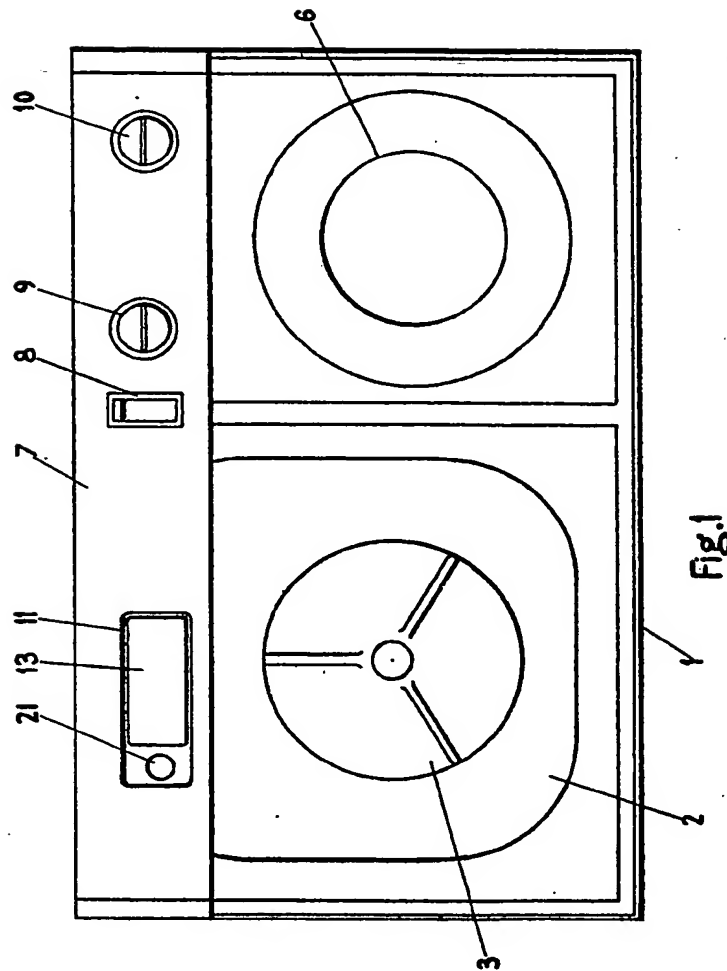
4. A clothes washing machine according to
 any preceding claim which is of a composite
 construction with the washing machine bowl
 and the drum of a spin drying machine
 mounted side-by-side within a single cabinet.

5. A clothes washing machine according to
 any preceding Claim, wherein the dispenser
 comprises a box-like container having an open-
 ing at the top for the introduction of the
 detergent, and a floor which slopes downwards
 towards one end, the inlet opening being loca-
 ted above the floor at the opposite end of the
 dispenser, and the outlet by which liquid en-
 90 tering the dispenser can pass to the bowl being
 located at the lower one end of the floor.

6. A clothes washing machine according to
 Claim 5, wherein the dispenser comprises a
 lower channel-shaped member incorporating
 said sloping floor, and an upper portion in
 the form of a box open at the top and bottom
 located within the lower portion with its lower
 edges spaced above the floor of the lower
 member, such that in use of the machine liquid
 passing along the floor from the inlet to the
 outlet openings carries with it a quantity of
 a charge of detergent placed within the dis-
 100 penser so as to gradually empty the dispenser
 of detergent.

7. A clothes washing machine substantially
 as shown in and as hereinbefore described with
 reference to Figures 1 to 4 of the accompany-
 105 ing drawings.

For the Applicants,
 H. V. A. KIRBY,
 Chartered Patent Agent.



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COMPLETE SPECIFICATION

2 SHEETS

This drawing is a reproduction of
the Original on a reduced scale
Sheet 2

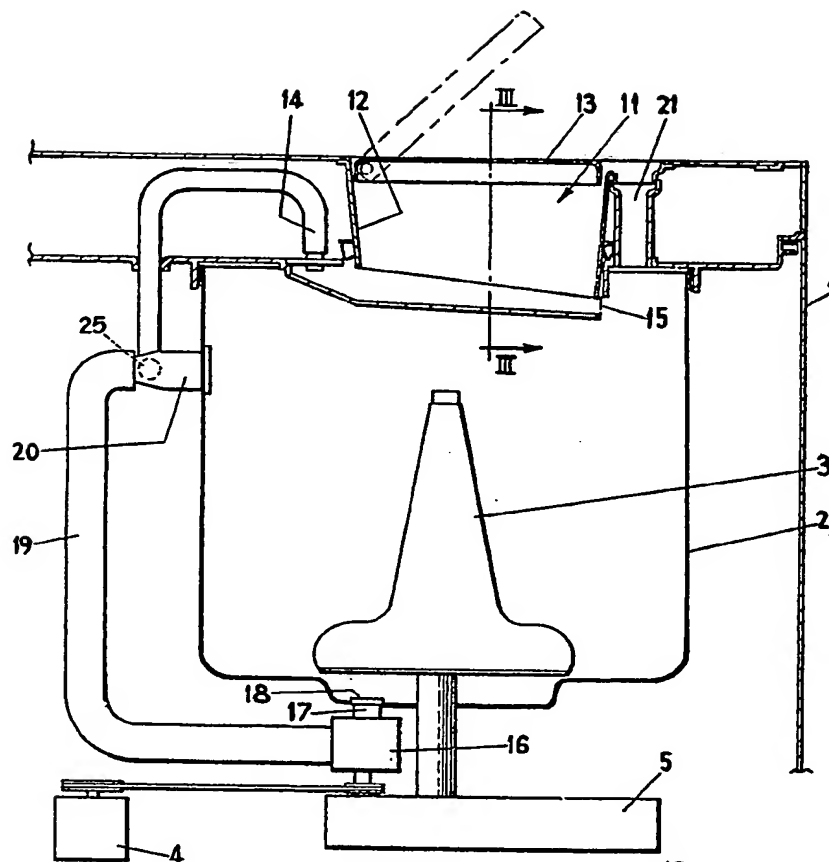


Fig. 2

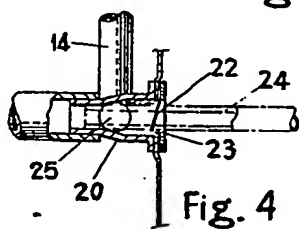


Fig. 4

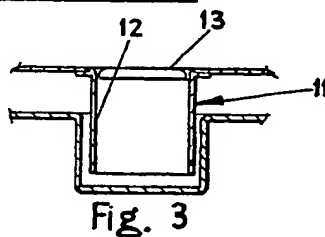


Fig. 3